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F1K 4A3 4A6 4C1 6B

(54) COUPLING ASSEMBLY

(71) We, MICHAEL JOHN BAVIN, and JOHN ROGER SPEIRS, both British Subjects, of 101 Victoria Road, Diss, Norfolk, and Furze Bank, Frenze Road, Diss, Norfolk, respectively, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an assembly for enabling an electrically powered hand drill to be used for turning an internal combustion engine.

According to the present invention, there is provided an assembly for enabling an electrically powered hand drill to be used for turning an internal combustion engine, which assembly comprises a first part receivable in the chuck of the drill for rotation therewith; a second part detachably engageable with said first part and arranged for rotation therewith about a common rotational axis; said second part being connectable with the engine for driving relationship therewith, each said part having a respective portion co-operable with the other to provide a driving coupling therebetween; the arrangement being such that, in use, said first part is brought into driving engagement with said second part whereby any rotational movement of said part is transmitted to said second part to turn the engine, said parts being freely disengageable along said axis one with respect to the other to break said driving coupling.

Each of said parts may be of substantially cylindrical shape. Said second part may include a notch extending inwardly from the circumference thereof, and an axially extending drum portion for receiving an engine starting cord.

The assembly includes connecting means for drivingly connecting said second part to the flywheel of the engine. The assembly may include means allowing axial movement to be imparted to said second part with respect to the flywheel for frictional locking engagement one with respect to the other. A frictional element carried by one of said parts causes or allows said driving coupling between said first and second parts. The frictional element may be resilient or elastomeric, and may be carried by said first part.

In another embodiment, one of said parts has a projection engageable in a groove formed in the other of said parts. The assembly may include a third part for drivingly connecting said second part to the engine. The projection may be carried by said first part. The projection and the groove may be arcuate. The depth of the groove increases between one end of the groove and the other end, and the depth of the projection increases between one end of the projection and the other end.

The invention will now be described by way of example with reference to the accompanying drawings wherein:—

Figure 1 is an exploded side view showing the component parts of one embodiment of the assembly;

Figure 2 is one end elevation of the first part of the assembly shown in Figure 1;

Figure 3 is one end elevation of the second part of the assembly shown in Figure 1;

Figure 4 is an end elevation of another embodiment of the assembly; and

Figure 5 is a section on the line 5—5 of Figure 4.

In one embodiment of the invention, and with reference to Figures 1 to 3 of the drawings, an assembly 1 for enabling a power operated hand tool to be used for turning an internal combustion engine comprises a first part constituted by a disc 2 having a first or convex surface 3 and a second surface 4. The disc 2 has an axially extending threaded through bore 5 to receive and secure, by means of a nut, a driving spindle 6 extending axially outwardly from each side of the disc. The portion of the spindle 6 extending axially outwards from the first surface 3 of the disc 2 constitutes a spigot which is engageable with the jaws of a chuck 7 of an electrically operated hand drill 8. The portion of the

spindle 6 extending from the second surface 4 of the disc constitutes a guide boss 9 of larger diameter than the spigot for engaging a second part 10 of the assembly to be described hereinafter. The spindle 6 is secured to the disc 2 by means of a lock nut 11. The second surface 4 supports two axially extending, diametrically opposed and concentrically disposed projecting lugs 12 for engaging the second part 10 of the assembly 1. Each lug 12 is defined by an arcuate member disposed radially towards the outer periphery of the disc. The axially outer face of each lug is inclined with respect to the second surface 4.

The second part 10 of the assembly is defined by a cylindrical block having a flange 13 of greater diameter at one end thereof. The flange 13 includes a chordally extending notch 14 of suitable dimension to anchor one end of an engine starting cord (not shown) therein. The second part 10 has three angularly spaced bores 15 which extend axially with respect to the block for slidingly receiving the shank of a respective countersunk headed bolt 16 passing therethrough for securing the second part 10 to a third part 17 of the assembly to be described hereinafter. The axially outer surface of the flange 13 includes two diametrically opposed, concentric arcuate grooves 18 for engagement with the lugs of the first part. The depth of each groove 18 increases from one end of the groove to the other. The block includes an axial cylindrical recess 19 for receiving the boss 9 of the first part therein in sliding relationship.

The third part 17 of the assembly constitutes connecting means and comprises a cylinder 20 having first and second end surfaces. The first end surface 21 surrounds the free end of an axial tapped recess 22 dimensioned to provide a connection to a shaft 23 of an internal combusion engine flywheel 24 whose starter pulley has been removed. The second end surface 25 includes three angularly spaced and axially tapped blind bores 26 for receiving a respective one of the bolts 16 to secure the second part 10 to the third part 17.

In operation, the first part is secured by the spigot to the chuck 7 of the electrically operated hand drill 8 for rotation therewith. The third part 17 is secured to the flywheel shaft 23, and the second part 10 secured by the bolts 16 to the third part 17. The two parts are coupled by bringing the first part, manually, into driving engagement with the second part 10 such that the lugs 12 engage the grooves 18, the boss 9 acting as a guide in sliding relationship with the recess 19 and ensuring rotation of the two parts about a common rotational axis. The electric drill 8 is started, causing rotation of the first part whereby the flywheel 24 of the internal combustion engine is turned. When the engine starts and the angular speed of the flywheel is greater than that of the drill chuck, the first part is thrown out of engagement with the second part 10 due to camming action between the lugs 12 and their respective grooves 18 thereby uncoupling the two parts. The drill may then be stopped.

It will be understood that the notched flange 13 of the second part 10 may be used with a starting rope or cord to start the engine in conventional manner, the second and third parts being in rotatable connection with the engine flywheel.

In another embodiment of the invention, and referring to Figures 4 and 5, the assembly includes a first part 101 arranged to be received for rotation by the drill 8 and adapted to be brought into driving engagement with a second part 102.

The first part 101 includes a frictional element constituted by a resilient cup shaped member 103 formed of an elastomeric material. The base of the resilient member 103 is annular and is bonded to a face of a coaxial annular metal disc 104 having a greater diameter than the body of the cup shaped member 103. The bonding provides also a skin 103*a* which extends from the the outer surface of the member 103 to cover the radially exposed portions of the disc 104. The member 103 and the disc 104 are disposed concentrically about a spindle 105, each end portion of the spindle extending outwardly in an axial direction with respect to the first part 101. The spindle 105 has a fixed radial flange 106 in abutment with the bottom surface of the cup of the member 103, and which flange 106 co-operates with an axially movable lock nut 108 carried on a threaded portion 107 of the spindle 105. The arrangement is such that the member 103 and the disc 104 are located intermediate the flange 106 and the nut 108. When the nut 108 is moved along the spindle towards the flange 106, the nut 108 bears against the disc 104 so as to clamp the member 103 and the disc 104 between the flange 106 and the nut 108.

One of the end portions of the spindle 105 defines a spigot 109 receivable by the jaws of the drill chuck 7. To minimize relative rotational movement between the spigot 109 and the chuck 7, the spigot 109 is formed with three flats 109*a* spaced equiangularly about the spigot. The other end portion of the spindle 105 defines a boss 110 which is dimensioned to be a sliding fit in one end portion 111 of a bore 112 formed in the second part 102.

The second part 102 comprises a cylin-

drical drum 113 having a first flange 114 and a second flange 115. One end of the drum 113 has a smaller diameter and a coaxial cylindrical projection 116 defining connecting means. The second flange 115 has a frusto-conical portion 117 tapering towards the free end of the projection 116. The first flange 114 includes a notch 118 extending inwardly from the outer periphery of the flange and provides means for anchoring one end of a manual starting cord (not shown). The bore 112 extends coaxially through the second part 102, the bore being tapped, except for the end portion 111 adajacent the flange 114, to permit connection of the second part with the flywheel shaft 23. The end portion 111 defines a sleeve for receiving the boss 110 in sliding fit relationship and ensuring coaxial alignment between the two parts. The cylindrical drum 113 has a radial hole 119 which extends inwardly, the hole 119 permitting a bar (not shown) to be inserted therein to act as a lever to rotate the second part 102 about the shaft 23 in order to nip the second part 102 against the flywheel 24 when connecting the one to the other.

In operation, the first part 101 is mounted on the drill 8 by engaging the spigot 109 in the chuck 7. The second part 102 is connected to the shaft 23 and nipped against the flywheel 24. The boss 110 is inserted into the sleeve 111 and the frictional element 103 brought into frictional engagement with the exposed face of the flange 114. Sufficient pressure is applied to the first part 101 to maintain a driving couple between the two parts 101 and 102 when the drill 8 is actuated. When the engine starts, the first part 101 will be withdrawn from the second part 102 by an operator so as to break the driving couple.

It will be understood that either embodiment of the assembly may be used to start an internal combustion engine which is difficult to start with the starting cord or kick start gear provided normally.

It is envisaged that the assembly could also be used to start an outboard motor fitted in a boat in conjunction with a low power i.e./12—24 Volts electrical system in the boat where a suitable electrically powered hand drill is available.

WHAT WE CLAIM IS:—

1. An assembly for enabling an electrically powered hand drill to be used for turning an internal combustion engine, which assembly comprises a first part receiveable in the chuck of the drill for rotation therewith; a second part detachably engageable with said first part and arranged for rotation therewith about a common rotational axis; said second part being connectable with the engine for driving relationship therewith, each said part having a respective portion co-operable with the other to provide a driving coupling therebetween; the arrangement being such that, in use, said first part is brought into driving engagement with said second part whereby any rotational movement of said first part is transmitted to said second part to turn the engine, said parts being freely disengageable along said axis one with respect to the other to break said driving coupling.

2. An assembly as claimed in Claim 1 wherein each of said parts is of substantially cylindrical shape.

3. An assembly as claimed in Claim 2 wherein said second part includes a notch extending inwardly from the circumference thereof, and an axially extending drum portion for receiving an engine starting cord.

4. An assembly as claimed in any one of the preceding claims and including connecting means for drivingly connecting said second part to the flywheel of the engine.

5. An assembly as claimed in Claim 4 and including means allowing axial movement to be imparted to said second part with respect to the flywheel for frictional locking engagement one with respect to the other.

6. An assembly as claimed in any one of the preceding claims wherein a frictional element carried by one of said parts causes or allows said driving coupling between said first and second parts.

7. An assembly as claimed in Claim 6 wherein said frictional element is resilient.

8. An assembly as claimed in Claim 6 or Claim 7 wherein said frictional element is elastomeric.

9. An assembly as claimed in any one of Claims 6 to 9 wherein said frictional element is carried by said first part.

10. An assembly as claimed in any one of Claims 1 to 3 wherein one of said parts has a projection engageable in a groove formed in the other of said parts.

11. An assembly as claimed in Claim 10 including a third part for drivingly connecting said second part to the engine.

12. An assembly as claimed in Claim 10 or Claim 11 wherein said projection is carried by said first part.

13. An assembly as claimed in any one of Claims 10 to 12 wherein said projection and said groove are arcuate.

14. An assembly as claimed in Claim 13 wherein the depth of the groove increases between one end of the groove and the other end, and the depth of the projection increases between one end of the projection and the other end.

15. An assembly for enabling an elec-

trically powered hand drill to be used for turning an internal combustion engine, which assembly is substantially as herein described with reference to, and as shown in, Figures 1 to 3 and, Figures 4 to 5 of the accompanying drawings.

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1380643 COMPLETE SPECIFICATION
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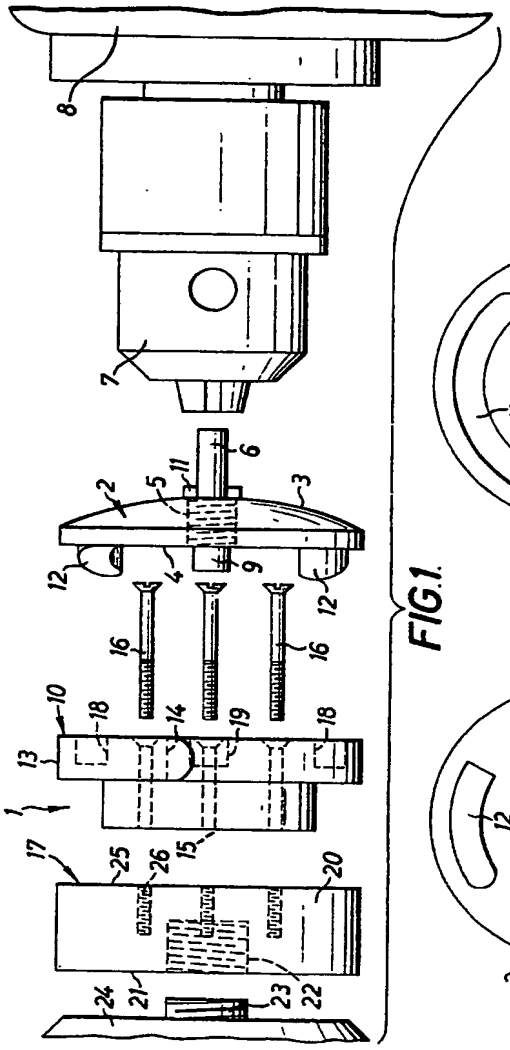

FIG.1.

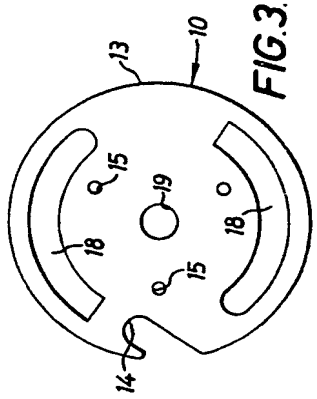

FIG.3.

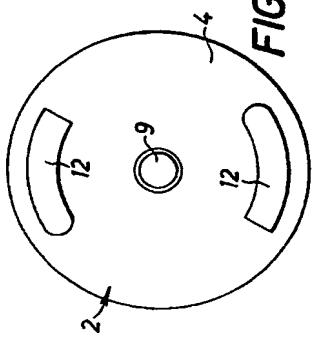

FIG.2.

1380643 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

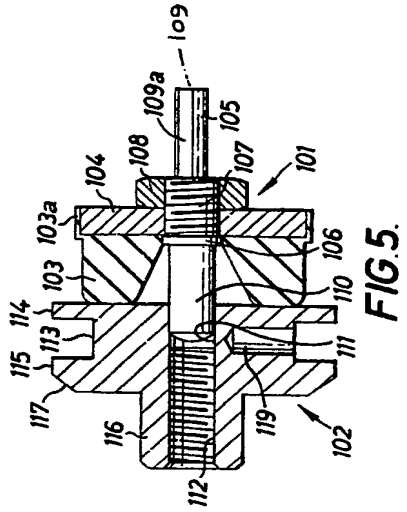

FIG.5.

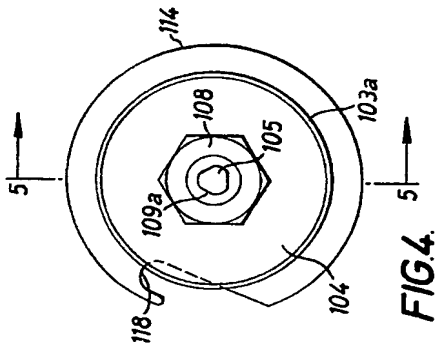

FIG.4.